

Advanced Guidance, Navigation and Control Design for Autonomous Rendezvous and Docking, Phase I

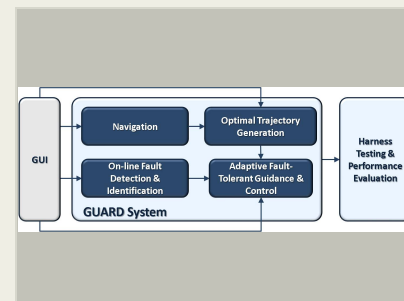
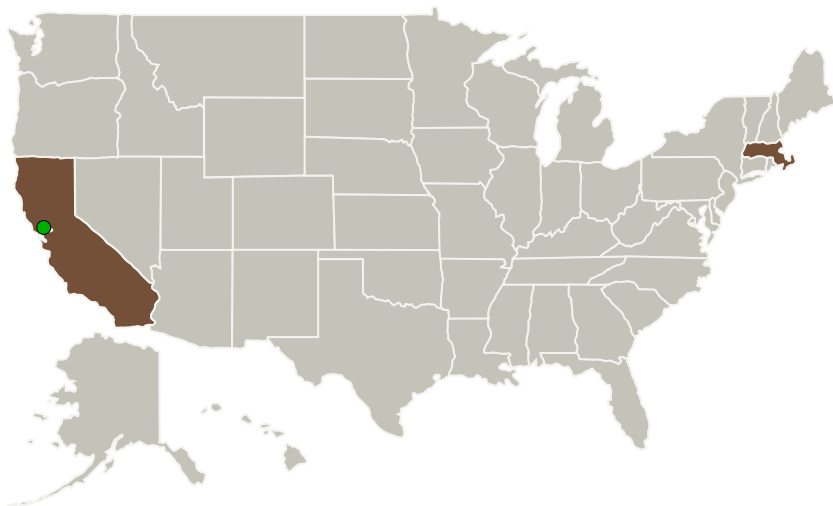
Completed Technology Project (2014 - 2014)



Project Introduction

SSCI, in collaboration with University of Texas, Austin (UTA), proposes to develop, integrate, implement and test a novel framework for the design and performance evaluation of Guidance, Navigation & Control algorithms for spacecraft Autonomous Rendezvous and Docking (AR&D). The framework is referred to as the GUARD (GUIdance, Navigation and Control for AR&D), and will include a suite of advanced navigation, optimal trajectory generation, Failure Detection and Identification (FDI), and constrained adaptive fault-tolerant guidance and control algorithms that can be tailored to a specific AR&D mission and tested with respect to a given set of requirements and specifications. Specific Phase I tasks include: (i) Develop GN&C-oriented and high-fidelity dynamic models for AR&D; (ii) Develop Optimal AR&D Algorithms under non-convex constraints; (iii) Develop Constrained Control Algorithms; (iv) Integrate the G&C Algorithms with Vision-based Navigation Algorithm; and (v) Carry out initial simulation testing & performance evaluation. Phase II will be focused on further maturation of the approach, rigorous Verification and Validation of the overall GUARD system, and its implementation on an experimental test bed at UTA. Dr. Behcet Acikmese of UTA will be our subcontractor under the project.

Primary U.S. Work Locations and Key Partners



Advanced Guidance, Navigation and Control Design for Autonomous Rendezvous and Docking Project Image

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Organizations Performing Work	Role	Type	Location
Scientific Systems Company, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Woburn, Massachusetts
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Massachusetts
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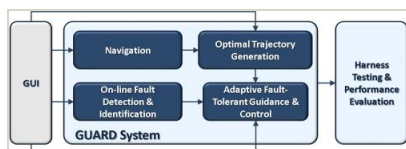
Project Transitions

**June 2014:** Project Start**December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140736>)

Images



Project Image

Advanced Guidance, Navigation and Control Design for Autonomous Rendezvous and Docking Project Image

(<https://techport.nasa.gov/image/129980>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Scientific Systems Company, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

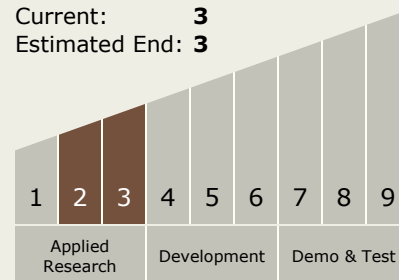
Jovan Boskovic

Technology Maturity (TRL)

Start: 2

Current: 3

Estimated End: 3



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Technology Areas

Primary:

- TX04 Robotic Systems
 - └ TX04.5 Autonomous Rendezvous and Docking
 - └ TX04.5.2 Rendezvous & Docking Algorithms

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System